
REMARKS

Claims 1, 3-8, 10-22 and 24 are presently pending in this application.

Reconsideration and allowance of all the rejected claims are respectfully requested in view of the following remarks.

As a preliminary matter, Claim 1 is amended for clarity to put the claim in better U.S. form. No new matter and no new issues are raised by this amendment, which is fully supported in the specification, *e.g.*, at page 2, line 25 – page 3, line 3. Claims 1 and 11 are amended herein to recite proper U.S. Markush language. Applicants submit that these amendments are not limiting in any way.

An Appendix is attached hereto illustrating Chart 1 and Chart 2, which find support in Table 3 on page 234 of the Specification (Chart 1) and Table 7 on page 245 of the Specification (Chart 2).

Claim Rejection Under 35 U.S.C. §112 (Second Paragraph)

Claims 5 and 24 stands rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. In the February 28, 2006 Amendment, Applicants separated Claim 5 into amended Claim 5 and new Claim 24. These claims are presently rejected for allegedly lacking antecedent basis for the claim term “a pre-crystallization composition.” Applicants do not understand this rejection, as the term “a pre-crystallization composition” is an element recited for the first time in each of these claims and is preceded by the word “a” – thus, no antecedent basis is necessary for this element.

Claims 5 and 24 are nevertheless amended herein for clarity. The amendments are not believed to change the scope of the claims at all or add any new matter. Support for these claims may be found in the specification, *e.g.*, at page 26, lines 8-page 28, line 4 (claim 5) and at page 47, line 8- page 49, line 2 (claim 24).

Applicants respectfully submit that the scope of the claim as amended for clarity, would be reasonably ascertainable by those skilled in the art, and thus the claims are not indefinite. See MPEP 2173.05(e). As these amendments are believed to overcome the rejection, Applicants respectfully request entry of the amendments and withdrawal of the rejection. Should the Examiner deem the rejection is not overcome, further to MPEP 2173.05(e), he or she is invited to suggest corrections to overcome the alleged antecedent problems.

Claim Rejection Under 35 U.S.C. §103

Claims 1, 3, 5, 7, 10-12 and 24 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Abe et al., hereinafter "Abe," (U.S. Pat. 5,439,865) taken together with Kaneko et al., hereinafter "Kaneko," (U.S. Pat. 6,800,388 B2) or Monceaux et al., hereinafter "Monceaux," (U.S. Pat. 5,622,680). Claims 4, 6, 8, and 13-22 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Abe taken together with Kaneko or Monceaux, as applied to claims 1, 3, 5, 7, 10-12 and 24 above, and in further view of Tan et al., hereinafter "Tan," (U.S. Pat. 6,620,762).

Applicants respectfully traverse the obviousness rejection as it applies to all claims based on the unexpectedly superior synergistic effect achieved by the presently claimed catalysts. Accordingly, reconsideration and withdrawal of this rejection are requested.

As indicated in the February 28, 2006 Amendment, synergism may point toward nonobviousness. See MPEP 2141. The synergism in the present case achieves unexpectedly superior results as demonstrated in the specification.

Applicants respectfully submit that one of ordinary skill in the art would expect that by combining materials disclosed in two or more references, the result would be a blending or averaging of the properties of the materials. In the present invention, however, as stated in the

present application (paragraphs [0195] through [0197] on page 12 of the published application

US 2005/0266986), the presently claimed combination remarkably enhances the properties of the perovskite-type composite oxides.

[0195] The exhaust gas purifying catalyst of the present invention thus obtained can allow a noble metal to be stably contained in a perovskite-type composite oxide and, in addition, **remarkably increase** the thermostability of the perovskite-type composite oxide by the action of at least one of theta-alumina and alpha-alumina.

[0196] In each perovskite-type composite oxide, the noble metal is finely and highly dispersed thereby to maintain its high catalytic activity even in long-term use in an atmosphere of high temperature. This is because of the self-regenerative function in which the noble metal repetitively undergoes solid-solution under an oxidative atmosphere and deposition under a reducing atmosphere with respect to the perovskite structure. This self-regenerative function also enables the resulting catalyst to achieve satisfactory catalytic activity even if the amount of the noble metal is significantly reduced.

[0197] The perovskite-type composite oxide containing a noble metal **exhibits increased thermostability by the action of at least one of theta-alumina and alpha-alumina. This prevents the perovskite-type composite oxide from grain growth and a decreased specific surface area in an atmosphere of high temperature of, for example, 900°C. to 1000°C., or further exceeding 1050°C. (emphasis added)**

Thus, the present invention achieves a synergistic effect in a chemical case, which points to nonobviousness. See MPEP 2141.

The data provided between examples and comparative examples throughout the application demonstrate the unexpectedly superior results achieved by the present invention.

See *e.g.*, Table 1 (page 52-53 of the published application), Table 3 (page 53-54), Table 4 (page 55), Table 5 (page 56), Table 6 (page 56-57), Table 7 (page 58).

By way of example, superior results of the present invention are shown in Table 3. For convenience, Applicants attach hereto Chart 1 that is supported by Table 3 on page 234 of the Specification. Table 3 demonstrates how the combination of theta alumina with the perovskite structures of the present invention, are better at suppressing reduction of specific surface area after an endurance treatment at high temperature, than structures having a different alumina

type. For example, as illustrated in Chart 1, Example QA-14 and Comparative Example QX-8 include the same Perovskite-type composite oxide structure, but have a different alumina type (QA-14: La-theta-alumina, QX-8: gamma alumina) than each other. As can be seen in Table 3, even though the specific surface area of QA-14 is smaller than that of QX-8 at the beginning of a high temperature endurance treatment, QA-14 is much better at suppressing reduction of its specific surface area after endurance treatment, in comparison with QX-8. The Example QA-14, which includes theta-alumina, has an after-endurance-treatment/before endurance treatment (at 1150 degrees C) ratio of 71.1, as compared to Comparative Example QX-8 having a ratio of only 30.7. This means that the combination of Perovskite-type composite oxide ($\text{La}_{1.0}\text{Fe}_{0.95}\text{Pd}_{0.05}\text{O}_3$) and theta-alumina is superior to the combination of the same perovskite-type composite oxide and gamma-alumina in endurance performance at high temperature. The combination of this Perovskite-type composite oxide and theta-alumina can provide higher purification performance.


Table 7 also demonstrates superior results of the present invention. For convenience, Applicants attach hereto Chart 2 that is supported by Table 7 on page 245 of the specification. In particular, Table 7 demonstrates *inter alia*, that in examples where alumina supports Perovskite-type composite oxide ($\text{La}_{1.0}\text{Fe}_{0.95}\text{Pd}_{0.05}\text{O}_3$), RC-13 (which employs theta-alumina) is superior to RX-13 (which employs gamma alumina) in HC 50% purification, even though an amount of noble metals in RC-13 is less than that in RX-13. See also attached Chart 2.

These are but a few of the numerous examples throughout the specification, (particularly in the examples and tables summarizing the examples), of unexpectedly superior results achieved by the present invention, in particular the combination of Perovskite-type composite oxide and theta-alumina. Applicants respectfully request that the Examiner consider these unexpectedly superior results as indicia of non-obviousness and reconsider and withdraw the obviousness rejection in its entirety.

If the Examiner believes that there is any issue which could be resolved by a telephone or personal interview, the Examiner is respectfully requested to contact the undersigned attorney at the telephone number listed below.

Applicants hereby petition for any extension of time which may be required to maintain the pendency of this case, and any required fee for such an extension is to be charged to Deposit Account No. 50-0951.

Respectfully submitted,


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[Chart 1] Comparison between the Example QA-14 and Comparative Example QX-8

Examples / Comparative Examples	Composition	Test Example 2			
		Specific surface area (m ² /g)		After endurance treatment	
		Before high temperature endurance treatment	After endurance treatment/Before endurance treatment	After endurance treatment	After endurance treatment
		(1000°C)	(1000°C) (%)	(1150°C)	(1150°C) (%)
Example QA-14	La _{1.00} Fe _{0.95} Pd _{0.05} O ₃ / La-theta-alumina (La: 4%) (1:1)	87.5	94.3	62.2	71.1
Comparative Example QX-8	La _{1.00} Fe _{0.95} Pd _{0.05} O ₃ / gamma-alumina (1:1)	140.6	72.1	43.2	30.7

[Chart 2] Comparison between the Example RC-13 and Comparative Example RX-13

Examples	Composition		Amount supported (g/L)			Test Example 3	
	Inner layer	Outer layer	Pt	Pd	Rh	Endurance test Cycles (hrs)	Endurance purification temperature (°C)
Example RC-13	La _{0.10} Fe _{0.95} Pd _{0.05} O ₃ / La-theta-alumina (La: 4%) (1:1) (28 g) + Pt/CeO ₂ -alumina (60 g) + Pt-theta-alumina (70 g)	Pt-Rh/IrO ₂ -alumina (30 g) + Pt/CeO ₂ -alumina (30 g) + Pt-theta-alumina (70 g)	0.60	0.30	0.40	40	377
Comparative Example RX-13	La _{1.00} Fe _{0.95} Pd _{0.05} O ₃ / gamma-alumina (1:1) (60 g) + gamma-alumina (30 g)	Pt-Rh/CeO ₂ -alumina (30 g) + gamma-alumina (30 g)	1.00	0.66	0.50	48	> 500